

AMENDMENTS TO THE CLAIMS

The following is a complete, marked-up listing of revised claims with a status identifier in parenthesis, underlined text indicating insertions, and strike through and/or double-bracketed text indicating deletions.

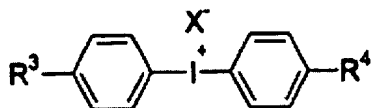
LISTING OF CLAIMS

1. (Currently Amended) A composition for forming a porous dielectric film, comprising:

- (i) a siloxane-based resin precursor;
- (ii) a condensation catalyst generator;
- (iii) a pore-generating material; and
- (iv) a solvent for dissolving the components (i)~(iii), wherein:

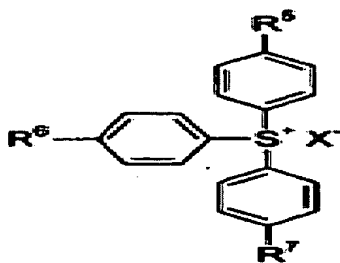
the condensation catalyst generator is a ~~photoacid generator or~~ photobase generator capable of generating ~~an acid or base~~ by light exposure or heating, and

~~the photoacid generator is at least one compound selected from the group consisting of compounds represented by Formulae 5 to 7 below:~~



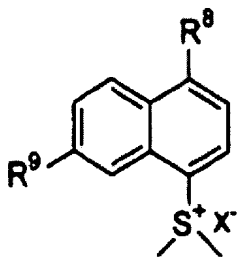
(5)

~~wherein R³ and R⁴ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group, and X is a sulfonate derivative;~~



(6)

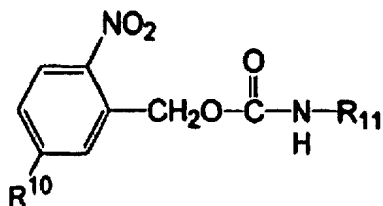
wherein R^5 , R^6 and R^7 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X is a sulfonate derivative; and



(7)

wherein R^8 and R^9 are each independently a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X is a sulfonate derivative, and

the photobase generator is a compound represented by Formula 8 below:



(8)

wherein R^{10} is a hydrogen atom, a hydroxyl group, a C_{1-6} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and R^{11} is a cyclohexyl, naphthyl,

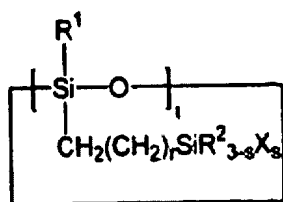
adamantyl, nitrophenyl or methoxyphenyl group.

2. (Original) The composition according to claim 1, wherein the amount of the condensation catalyst generator is 0.1~20 parts by weight, based on 100 parts by weight of the total solid content (the siloxane-based resin precursor + the condensation catalyst generator + the pore-generating material).

3. (Original) The composition according to claim 1, wherein the amount of the pore-generating material is 0.1~95 parts by weight, based on 100 parts by weight of the total solid content (the siloxane-based resin precursor + the condensation catalyst generator + the pore-generating material).

4. (Original) The composition according to claim 1, wherein the siloxane-based resin precursor is selected from the group consisting of hydrogen silsesquioxane, an alkyl silsesquioxane, an aryl silsesquioxane and a copolymer thereof.

5. (Original) The composition according to claim 1, wherein the siloxane-based resin precursor is prepared by hydrolysis and polycondensation of at least one cyclic siloxane based monomer selected from the group consisting of compounds represented by Formula 1 below:



(1)

wherein R^1 and R^2 are each independently a hydrogen atom, a C_{1-3} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-5} aryl group, X is a halogen atom or a C_{1-5} alkoxy group, r is an integer of from 0 to 10, s is an integer of from 1 to 3 and t is an integer of from 3 to 8,

and at least one silane-based monomer selected from the group consisting of compounds represented by Formulae 2 to 4 below:



wherein X^1 , X^2 , X^3 and X^4 are each independently a halogen atom or a C_{1-5} alkoxy group



wherein R^1 is a hydrogen atom, a C_{1-3} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X^1 , X^2 and X^3 are as defined above; and



wherein R^1 and R^2 are each independently a hydrogen atom, a C_{1-3} alkyl group, a C_{3-10} cycloalkyl group or a C_{6-15} aryl group, and X^1 and X^2 are as defined above,

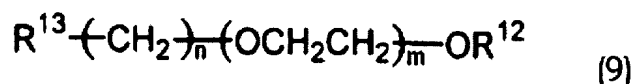
using an acid or base catalyst and water in an organic solvent.

6. (Original) The composition according to claim 5, wherein the acid catalyst is selected from the group consisting of hydrochloric acid, nitric acid, benzene sulfonic acid, oxalic acid and formic acid, and the base catalyst is selected from the group consisting of potassium hydroxide, sodium hydroxide, triethylamine, sodium bicarbonate and pyridine.

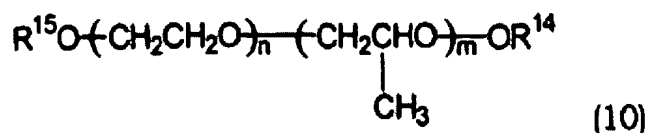
7. (Original) The composition according to claim 5, wherein the equivalence ratio of the water used during the hydrolysis and condensation to reactive groups of the monomers is in the range of 1.0~100.0, and wherein the hydrolysis and condensation are carried out at a temperature of about 0~200°C. for 1~100 hours.

8-10. (Cancelled).

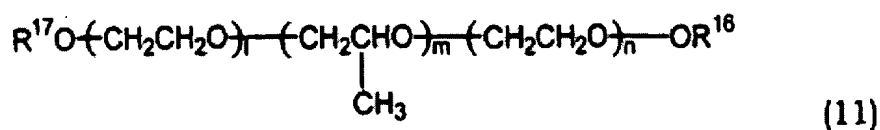
11. (Original) The composition according to claim 1, wherein the pore-generating material is at least one compound selected from the group consisting of compounds represented by Formulae 9 to 13 below:



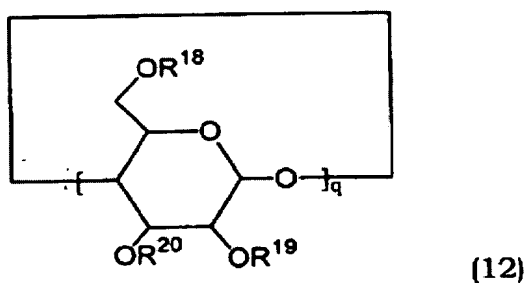
wherein R^{12} and R^{13} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $-Sir^1r^2r^3$ (in which r^1 , r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), m is an integer of from 20 to 80, and n is an integer of from 2 to 200;



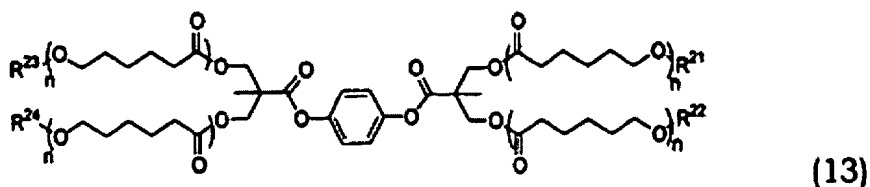
wherein R¹⁴ and R¹⁵ are each independently a hydrogen atom, a C₂₋₃₀ acyl group, a C₁₋₂₀ alkyl group or -Sir¹r²r³ (in which r¹, r² and r³ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₁₋₆ alkoxy group or a C₆₋₂₀ aryl group), and m and n are as defined above;



wherein R¹⁶ and R¹⁷ are each independently a hydrogen atom, a C₂₋₃₀ acyl group, a C₁₋₂₀ alkyl group or -Sir¹r²r³ (in which r¹, r² and r³ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₁₋₆ alkoxy group or a C₆₋₂₀ aryl group), l is an integer of from 2 to 200, and m and n are as defined above;



wherein R¹⁸, R¹⁹ and R²⁰ are each independently a hydrogen atom, a C₂₋₃₀ acyl group, a C₁₋₂₀ alkyl group or -Sir¹r²r³ (in which r¹, r² and r³ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₁₋₆ alkoxy group or a C₆₋₂₀ aryl group), and q is an integer of from 5 to 8; and



wherein R^{21} , R^{22} , R^{23} and R^{24} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $-Si^{r^1}r^2r^3$ (in which r^1 , r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), and n is an integer of from 2 to 200.

12. (Cancelled)

13. (Original) The composition according to claim 1, wherein an amount of the solvent is 20~99.9 parts by weight, based on 100 parts by weight of the composition (the siloxane-based resin precursor + the condensation catalyst generator + the pore-generating material + the solvent).

14-21. (Cancelled).

22. (Previously Presented) A porous dielectric film prepared from the composition of claim 1.

23. (New) A composition for forming a porous dielectric film, comprising:

- (i) a siloxane-based resin precursor;
- (ii) a condensation catalyst generator;

(iii) a pore-generating material; and

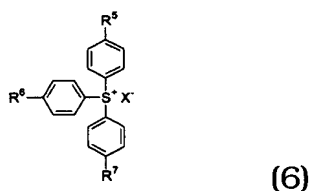
(iv) a solvent for dissolving the components (i)-(iii), wherein

the condensation catalyst generator includes a photoacid generator and a photobase generator capable of generating an acid and base by light exposure or heating, and

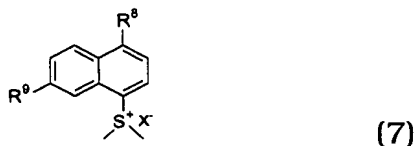
the photoacid generator is at least one compound selected from the group consisting of compounds represented by Formulae 5 to 7 below:



wherein R³ and R⁴ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group, and X is a sulfonate derivative;



wherein R⁵, R⁶ and R⁷ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group, and X is a sulfonate derivative; and

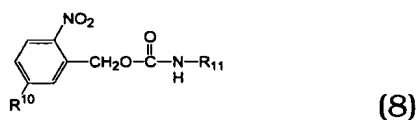


wherein R⁸ and R⁹ are each independently a hydrogen atom, a hydroxyl group,

a C₁₋₆ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group,

and X is a sulfonate derivative, and

the photobase generator is a compound represented by Formula 8 below:



wherein R¹⁰ is a hydrogen atom, a hydroxyl group, a C₁₋₆ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group, and R¹¹ is a cyclohexyl, naphthyl, adamantyl, nitrophenyl or methoxyphenyl group.

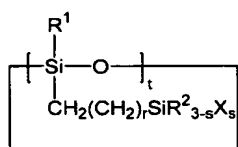
24. (New) The composition according to claim 23, wherein the amount of the condensation catalyst generator is 0.1~20 parts by weight, based on 100 parts by weight of the total solid content (the siloxane-based resin precursor+the condensation catalyst generator+the pore-generating material).

25. (New) The composition according to claim 23, wherein the amount of the pore-generating material is 0.1~95 parts by weight, based on 100 parts by weight of the total solid content (the siloxane-based resin precursor+the condensation catalyst generator+the pore-generating material).

26. (New) The composition according to claim 23, wherein the siloxane-based

resin precursor is selected from the group consisting of hydrogen silsesquioxane, an alkyl silsesquioxane, an aryl silsesquioxane and a copolymer thereof.

27. (New) The composition according to claim 23, wherein the siloxane-based resin precursor is prepared by hydrolysis and polycondensation of at least one cyclic siloxane based monomer selected from the group consisting of compounds represented by Formula 1 below:



(1)

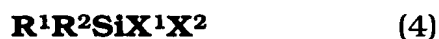
wherein R¹ and R² are each independently a hydrogen atom, a C₁₋₃ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₅ aryl group, X is a halogen atom or a C₁₋₅ alkoxy group, r is an integer of from 0 to 10, s is an integer of from 1 to 3 and t is an integer of from 3 to 8, and at least one silane-based monomer selected from the group consisting of compounds represented by Formulae 2 to 4 below:



wherein X¹, X², X³ and X⁴ are each independently a halogen atom or a C₁₋₅ alkoxy group;



wherein R¹ is a hydrogen atom, a C₁₋₃ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group, and X¹, X² and X³ are as defined above; and

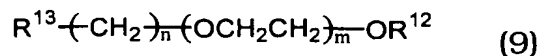


wherein R¹ and R² are each independently a hydrogen atom, a C₁₋₃ alkyl group, a C₃₋₁₀ cycloalkyl group or a C₆₋₁₅ aryl group, and X¹ and X² are as defined above,
using an acid or base catalyst and water in an organic solvent.

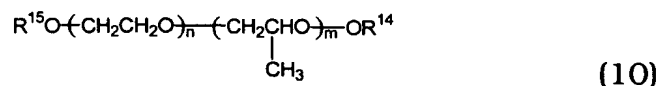
28. (New) The composition according to claim 27, wherein the acid catalyst is selected from the group consisting of hydrochloric acid, nitric acid, benzene sulfonic acid, oxalic acid and formic acid, and the base catalyst is selected from the group consisting of potassium hydroxide, sodium hydroxide, triethylamine, sodium bicarbonate and pyridine.

29. (New) The composition according to claim 27, wherein the equivalence ratio of the water used during the hydrolysis and condensation to reactive groups of the monomers is in the range of 1.0~100.0, and wherein the hydrolysis and condensation are carried out at a temperature of ~0~200°C for 1~100 hours.

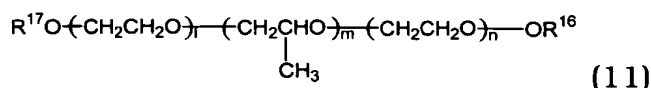
30. (New) The composition according to claim 23, wherein the pore-generating material is at least one compound selected from the group consisting of compounds represented by Formulae 9 to 13 below:



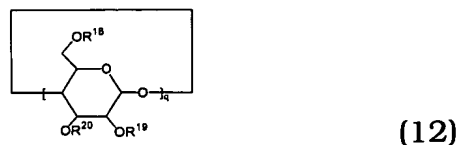
wherein R^{12} and R^{13} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $--Sir^1r^2r^3$ (in which r^1 , r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), m is an integer of from 20 to 80, and n is an integer of from 2 to 200;



wherein R^{14} and R^{15} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $--Sir^1r^2r^3$ (in which r^1 , r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), and m and n are as defined above;

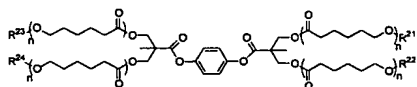


wherein R^{16} and R^{17} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $--Sir^1r^2r^3$ (in which r^1 , r^2 and r^3 are each independently a hydrogen atom, a C_{1-6} alkyl group, a C_{1-6} alkoxy group or a C_{6-20} aryl group), 1 is an integer of from 2 to 200, and m and n are as defined above;



wherein R^{18} , R^{19} and R^{20} are each independently a hydrogen atom, a C_{2-30} acyl group, a C_{1-20} alkyl group or $--Sir^1r^2r^3$ (in which r^1 , r^2 and r^3 are each

independently a hydrogen atom, a C₁₋₆ alkyl group, a C₁₋₆ alkoxy group or a C₆₋₂₀ aryl group), and q is an integer of from 5 to 8; and



(13)

wherein R²¹, R²², R²³ and R²⁴ are each independently a hydrogen atom, a C₂₋₃₀ acyl group, a C₁₋₂₀ alkyl group or --Si^{r1}r²r³ (in which r¹, r² and r³ are each independently a hydrogen atom, a C₁₋₆ alkyl group, a C₁₋₆ alkoxy group or a C₆₋₂₀ aryl group), and n is an integer of from 2 to 200.

31. (New) The composition according to claim 23, wherein an amount of the solvent is 20~99.9 parts by weight, based on 100 parts by weight of the composition (the siloxane-based resin precursor+the condensation catalyst generator+the pore-generating material+the solvent).